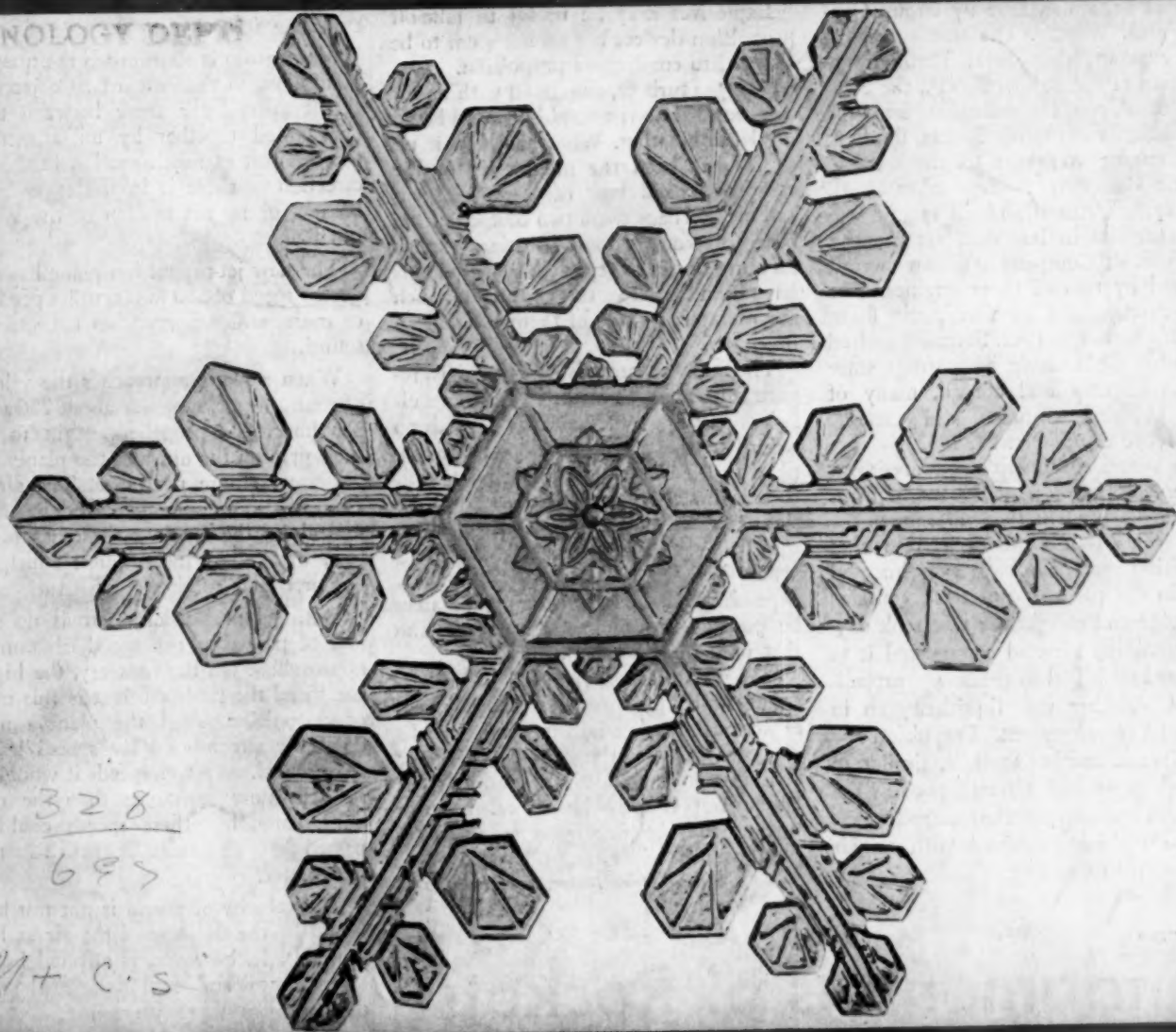


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SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE • JANUARY 15, 1944



Geometry in Nature

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A SCIENCE SERVICE PUBLICATION

AERONAUTICS

Jet-Propelled Planes

Several possible propulsion methods applicable to aircraft. Announcement of new fighters recalls previous experimentation in several countries.

► **FIGHTER AIRPLANES** employing jet-propulsion engines soon will be in production, having passed experimental tests successfully, the War Department announced Jan. 6. Originally of British design, work on the engines was begun in Great Britain in 1933 by Group Captain Frank Whittle. The first successful flight was in May, 1941. Through co-operation of the British R.A.F., the Ministry of Aircraft Production and the United States Army Air Forces, the first-flight engine was sent to the General Electric Company in September, 1941, and the first American-built engine was ready for test in less than six months. Bell Aircraft Company built an aircraft powered by two of these engines. The first jet-propulsion combat plane flight was on October 1, 1942. Several hundred successful flights have been made since in this country and abroad, many of them at high altitudes and extreme speed. (See *SNL*, Oct. 24, 1942)

The War Department's announcement arouses speculation as to the mechanisms that can be used in such aircraft.

There are four kinds of jet or rocket propulsion that have been experimented upon in the past. One of these contains an engine and compressor that took oxygen-containing air and compressed it to be mixed with fuel to produce a propelling jet. Another uses liquid oxygen in a similar arrangement. Propulsion by explosives is another method, similar to the rockets used in warfare, such as the famous bazooka. Another possibility is the gas turbine combined with an air compressor in one assembly.

Italian experiments of several years ago used the engine-compressor unit feeding air to a fuel jet. German reports published in translation by the National Advisory Committee for Aeronautics in 1942 used the liquid oxygen method.

Explosives may be useful in take-off propulsion devices but do not seem to be adapted to continuous propulsion.

The gas turbine, combined with an air compressor in one assembly, would be an ideal combination. What has held it up so far has been the inefficiency of the compressor and lack of a practical gas turbine. Perhaps these two obstacles have been overcome. Some Russian experimenting has been reported. Some patents have been issued in this country on such a combination, some of them to German inventors.

The new jet-propulsion engine is reported in press accounts to be more efficient than the old. That may be with no regard to the power developed and applied to the air jet, but the air jet itself is very inefficient as a means of propulsion, especially at low speeds. But there may be a saving of gasoline in that high octane gasoline is not required. In fact, depending on the kind of engine, it may be possible to use low grade fuel like that used by the Diesel engine.

The propulsion is reported in one account to be by means of short, sharp explosions; another said it was by means of a steady jet. If the engine-compressor combination is used, it is more likely the latter. But it may be either. Even a turbine may be run by a series of explosions instead of a steady stream.

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AERONAUTICS

Fundamentals of Rockets

► **INVENTORS** have dreamed of rocket ships flying about in space beyond the atmosphere, the rocket being the only sort of propulsion possible under the circumstances. The rocket ship, shooting out burning gases or other material at terrific speed, becomes a gun which is propelled by its own kick. But the high-

speeding bullet of any gun takes by far the greater portion of the energy developed by the explosion, more than 400 times as much as the gun kick in the case of the Springfield Army rifle. This makes the rocket the world's most wasteful motor.

Nevertheless it has its uses as a tem-

porary boost on occasion and has been so used in this war. There is no other means by which such a tremendous burst of power can be obtained with so little weight of machinery. Two rockets under the wings of an airplane will for a few minutes develop as much power as two extra engines, and help to get a heavily laden bomber off the ground.

A curious thing about rocket propulsion is that it really produces no new motion at all. The momentum of the two masses flying apart being equal, the center of gravity of two masses remains unmoved, or if it was moving in the first place, its motion is unaltered by the explosion that thrusts the masses apart.

Momentum is often called the quantity of motion, so that when two objects are thrust apart by a force between them (or pulled together by an attraction) there is just as much motion in the one direction as there is in the opposite direction, or no net motion of the system at all.

The new jet-propulsion plane has a reported speed of 500 to 600 miles per hour or more, which approaches the speed of sound.

When a plane approaches the velocity of sound in air, which is about 750 miles per hour, the propellers begin to lose their grip on the air, and the plane itself encounters more resistance. The air instead of sliding smoothly over the wings and along the fuselage, becomes turbulent, breaks up into eddies, whirlpools and irregular motions.

With jet propulsion there is no such loss of power as the speed of sound is approached. On the contrary, the higher the speed the more efficient is this mode of propulsion. And the plane can be especially streamlined for speeds higher than sound. At lower speeds it would encounter more resistance than the ordinary plane, but these speeds could be passed through so rapidly that this would not matter.

The velocity of sound is not much affected by the thinness of the air at high altitudes. It, however, is affected by the temperature and is faster at the low temperatures there prevailing.

A drop in temperature of 100 degrees Fahrenheit would increase the speed of sound by about 75 miles per hour.

Thin air also does not have the disadvantage for jet propulsion that it has for the propeller, for the jet is actually more efficient in the thin air high up than in the dense air at sea level.

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GENERAL SCIENCE

New A.A.A.S. President

Dr. A. J. Carlson, well-known Swedish-born professor of physiology at the University of Chicago, elected head of leading science association.

► THE VICTORY address of organized science in America may be delivered two Christmas seasons hence by a rugged, Swedish-born immigrant who has become one of the best-known of American researchers and teachers in physiology, Prof. Anton J. Carlson of the University of Chicago.

Prof. Carlson has just been elected president of the American Association for the Advancement of Science, it is announced at executive headquarters of the Association. Normally, he would preside over a great midwinter joint meeting of the Association and a score or more of affiliated scientific societies, during the holiday week at the close of this year. A year later he would present a major address as retiring president.

The Association is holding no midwinter meetings for the duration; and even if Germany collapses during 1944 it is improbable that the load on the country's transportation system could be eased sufficiently by the end of the year to justify the holding of large conventions. But by the close of 1945, when his retiring presidential address will be due, it is just possible that the thousands of top American scientists may again be able to get together, celebrate the victory which their efforts have helped to bring, and discuss plans and hopes for the future.

GENERAL SCIENCE

Science Future Bright

By PROF. ANTON J. CARLSON,
President, A.A.A.S.

► DESPITE man's global violence today, at no time in human history have the prospects of science, in the sense of increasing understanding and potential service to man, been brighter than they are for tomorrow. But if we expect man to adjust rationally and speedily to the new phase of our environment created by science, we must begin to give, through education, health, freedom and justice, as much attention to man as we

For such a possible Victory Meeting, Prof. Carlson can supply a fitting keynote speech. He has an unbroken record of utter and outspoken hostility to the interference with research and suppression of teaching in the Nazi-Fascist lands. Uncompromising search for all the facts, and complete freedom to report and interpret them, constitute the first article of his scientific creed.

Prof. Carlson was born on a farm in Sweden, near Göteborg, in 1875. At sixteen, he emigrated to America, and for a time earned his living as a carpenter in Chicago. He attended Augustana College in Illinois, graduating there in 1898. In 1902 he received his Ph.D. from Stanford University.

Practically the whole of his research and teaching career has centered at the University of Chicago, where for 40 years his "What is the evidence?" has been a standing challenge to succeeding generations of students. Of recent years, he has disagreed from time to time with the educational policies of President Robert M. Hutchins, and has come to be informally recognized as leader of the faculty group representing the "loyal opposition." The very vigor of clashing opinions, however, has in itself been evidence of full enjoyment (and employment) of freedom of speech at the University of Chicago.

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are now giving to chemistry, physics and the gadgets of engineering.

Provided the coming peace is worthy of that name and does not engender greater injustice, violence and misery than are inherent in war itself, science can render even greater service in the regeneration of civilization than it is now giving to the war effort. But this calls for even greater persistence, perspicacity and patience on the part of all workers in science than has been displayed by us in the past.

We must raze the ivory tower, en-

deavor to render all our new knowledge understood by all the people, and show by our actions that the men of science at least are largely guided by verified facts and reasons.

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PSYCHIATRY

Guidance Clinic Set Up To Control Alcoholism

► A NEW STEP toward control and prevention of habitual drunkenness, both now and after the war, is being taken, it appears from an announcement by Yale University.

The announcement is of the opening next month of a diagnostic and guidance clinic for inebriates, first of the kind in this country. The clinic and a similar one to be opened soon in Hartford, Conn., are sponsored jointly by the Yale Laboratory of Applied Physiology and the Connecticut Prison Association.

Dr. Howard W. Haggard of Yale will be in general charge with Dr. Ralph Banay, psychiatric consultant of the New York State Parole Board and former chief psychiatrist of Sing Sing prison, serving as medical director.

The clinics will not be sobering-up stations for drunks, it was emphasized. Nor will treatment for inebriety be given at the clinics.

Instead, a staff of psychiatrists, psychologists and social workers will study each patient, determine his type and the kind of treatment he requires, and



NEW PRESIDENT—A bust of Dr. A. J. Carlson, professor of physiology at the University of Chicago, who has just been made president of the American Association for the Advancement of Science.

arrange to use the existing resources of the community for his treatment and rehabilitation. Representatives of Alcoholics Anonymous and the Salvation Army and a legal consultant will be on call for assistance.

Serious as the problem of alcoholism is today, it is feared that after the war

it will become much worse. It is hoped, therefore, that the clinics may serve as experimental models for similar ones to be set up in other states. Opening of the clinics in this state at the present time is assisted by a large contribution to the Connecticut Prison Association from an anonymous Hartford donor.

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GENERAL SCIENCE

War Use of Scientists

Separate selective service for specialized personnel urged upon Congress by head of government's war research as aid to applying science to war.

► SCIENTIFIC men should have their own selective service system, in order to place them in war service exactly where needed, Dr. Vannevar Bush, director of the Office of Scientific Research and Development, recommends in a letter to Senator H. M. Kilgore (Dem., W. Va.). (*Science*, Dec. 31, 1943)

"The prosecution of modern war requires the treatment of scientific men as a special group to be specially allocated for work in the fighting services and in civilian research, and this cannot be done adequately under the present procedures of the Selective Service System," Dr. Bush says. "There is no question here of shielding a special class against the rigors of war. It is rather the question of the intelligent use of a great nation's asset. The young men who make up this group should be under orders to serve where needed and, if the public interest indicates that they should remain in the laboratory rather than serve in the field, they should be retained in the laboratory. Likewise, when they are needed in the field they should be transferred there under orders to share the combat hazards with the members of the Armed Services in performing their duties."

In his comment inspired by one of the provisions of the Kilgore bill (S. 702), Dr. Bush makes it clear that progress has been made in placing scientists where they serve most effectively, but that he believes Congress should act to give legislative authority for special procedures for the scientists.

The so-called war mobilization of science by creation of an over-all administration would interfere with the effective prosecution of the war, Dr. Bush contends, while the proposed requisitioning power covering scientific facilities is

not needed in his opinion. The bill's patent and inventions changes should not be made during wartime, Dr. Bush says, because they would be a source of confusion and dissatisfaction.

Necessary wartime controls over scientific research should not be perpetuated in peace because, Dr. Bush declared, "science flourishes to the greatest degree when it is most free."

The patent policy of the Office of Scientific Research and Development, the government's war research agency headed by Dr. Bush, which provides for government shop rights on inventions developed under contracts with research laboratories, which receive the commercial rights, will not work in time of peace, he believes, because the laboratories would not desire to work on a non-profit basis then, and it would be undesirable to limit unduly the competition in our industrial system.

Dr. Bush urged that the Congress take advantage of the expert advice that scientific men would be just as willing to give our law-makers as they would our government bureaus.

Because many universities and non-profit research institutions will be unable to finance research after the war from private sources, Dr. Bush suggests that it may be necessary for them to look to federal and state governments for financial support.

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PALEOBOTANY

Texas Climate Once Like That of Great Lakes Area

► TEXAS once had a climate resembling that of the Great Lakes region, if the testimony of pollen grains found deep in

a bog near Austin can be accepted.

Dr. J. E. Potzger of Butler University and Prof. B. C. Tharp of the University of Texas tell how they have found, in muck hauled up from around the 20-foot level in Patschke bog, a short distance east of the city, large numbers of Canadian spruce and fir pollen grains. (*Science*, Dec. 31, 1943) These trees now grow at lower altitudes only in the northern states. Even bog deposits of their pollen have not been previously reported from nearer than Bacon's swamp, Ind., about 800 miles to the north.

In the Patschke bog also were found

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masses of chestnut pollen grains, which have not previously been reported from less than 100 miles to the east of the bog. These were not from the same depth as the conifer pollens, but came from nearer the surface, especially at

the eight- and six-foot levels. This former chestnut forest, therefore, flourished at a later date than the very ancient conifer forest represented by the spruce-fir pollens.

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MEDICINE

Penicillin on Battlefield

Germ-fighting chemical proves itself of immense value in the control of infection in war wounds of armed forces in Sicily and North Africa.

► **PENICILLIN**, the powerful germ-fighter from mold, has proved itself on the field of battle, it appears from enthusiastic reports of its use in treating war wounded in Sicily and North Africa now reaching the United States. The reports in the *British Medical Journal* (Dec. 11, 1943), and the *Lancet* (Dec. 11, 1943), another leading British medical publication, cover a special three-months investigation made by Prof. H. W. Florey, of Oxford University, Brig. Hugh Cairns and other medical officers in the British Army.

"There can be little doubt that the preventions of infection with pyogenic cocci (pus-forming germs) or its control in war wounds is within reach," the *British Medical Journal* account states in quotation, apparently, from the report to the War Office and Medical Research Council. This formal report is said to be for official circulation only, corresponding apparently to a "restricted" report in the United States.

For the first time, the editor of the *Lancet* points out, surgeons can now sew up a gunshot wound without fear of dangerous spread of infection to the blood stream. Heretofore it has been considered necessary to leave infected wounds open until all pus had drained out. The change means not only a saving of life and limb but also of valuable fighting man-hours, dressings, hospital service, equipment and transport services.

Wounds treated with penicillin healed from three to six weeks faster than otherwise, the experienced war surgeons who shared in the investigation agreed.

A way to save precious supplies of penicillin was also found by Prof. Florey and his colleagues. By applying penicillin directly to the wound as early as possible, they found, much smaller quantities are required to check infection than when the drug is given by injection into

muscles or veins after the wounded man has reached the base hospital with a well-developed infection. If penicillin were plentiful, however, the surgeons would prefer giving it by injection in nearly all cases since by this method the drug would be carried by the blood stream to all living tissues and prevent multiplication of germs in them.

In some cases a powder of penicillin and a sulfa drug was dusted into the wound at the casualty clearing station. For the most part, however, penicillin

was not used this close to the battle field but was used at the forward base hospitals.

For flesh wounds, the preferred method, apparently, was to inject a solution of the calcium salt of penicillin through small rubber tubes. These were inserted into the wound after it had been surgically cleaned and decaying tissues cut away. Surgeons who do this preliminary job at the casualty clearing stations were warned not to cut away any more skin than absolutely necessary, so that the wounds can be sewed up after the penicillin application.

Wounds closed after this treatment may, after eight to 12 days, be found bathed in pink or green pus, but when this is wiped away, the wounds are seen to be clean and free from swelling or redness. Of 170 flesh wounds treated in this way at Tripoli and Sousse, most of them only three to seven days old when closed, only seven had to be classed as failures and those occurred early in the investigation before the technic had been fully worked out.

In case of gas gangrene, compound fractures and head and brain wounds, good results were also obtained.



HELLDIVER—This low-mid-wing monoplane, the latest of the Curtiss-Wright Helldiver series, proved its value in the attack against the Japanese stronghold at Rabaul in November. It was designed to carry a greater bomb load faster and farther than any similar aircraft type in the world. The bomb load is housed entirely within the belly of the fuselage, making the lines of the fuselage as aerodynamically clean as possible.

Valuable saving of manpower in highly trained troops such as parachutists was also achieved by use of penicillin in cases of gonorrhea that resisted sulfa drug treatment. Many such cases occurred in Tunisia shortly before the men were due to go into battle. With penicil-

lin, they were cured in about 48 hours. Comparison between penicillin and sulfa drugs in treatment of war wounds was not made because the investigation was limited to learning as rapidly as possible how efficient penicillin might be and how best to use it.

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PUBLIC HEALTH

Flu Pandemic Not Likely

Sulfa drug triumphs over the pneumonia which often follows an attack of influenza are largely responsible for avoiding a repetition of the epidemic of World War I.

► THOSE who have been worrying, as most persons have each fall and winter since the war started, over the possibility of a world-wide influenza epidemic as devastating as that of 1918, may be reassured by a statement by the editors of the *New England Journal of Medicine*. (Dec. 9, 1943)

"Any epidemic in the near future is likely to be much less severe than was the pandemic of 1918," they declare. "This, of course, is only speculation," they admit, "but is based on significant observations."

The observations are: 1. The influenza of the last war had a high mortality but the deaths were accounted for chiefly by complicating pneumonias in which the hemolytic streptococcus was the germ most frequently encountered. The same was true of the epidemics of measles in Army camps during the last war.

2. During the 1940-1941 epidemic of influenza, the staphylococcus played an important role in complicating pneumonias but intensive treatment with the sulfa drugs gave quite encouraging results. The results, in fact, were so good that it was suggested that in the event

of another influenza epidemic it might be well to use sulfa drugs early in severe cases. This is especially recommended for patients with severe prostration, signs of tracheobronchial and lung involvement and presence of appreciable numbers of hemolytic streptococci and staphylococci in the sputum.

3. Another encouraging omen comes from recent reports concerning measles. Outbreaks of this occurred in the Army during 1943 but, unlike the 1918 experience, deaths were rare. This is attributed to widespread use of sulfa drugs in all cases with lung involvement.

"It is not unreasonable," the medical authorities comment, "to expect a similar low fatality rate from influenza occurring under like circumstances."

For the future, there is even more reason for confidence when supplies of penicillin become large enough for large-scale use, since this chemical from mold is especially efficacious in infections with the staphylococcus. This germ is being found in increased frequency in surgical conditions and in complications of other respiratory diseases, so may be expected to play a considerably greater role in future influenza epidemics than in any previous ones.

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cartoons have appeared in many American newspapers and magazines. Their idea for using the comic book to give easy, graphic lessons in civilian defense appealed to José Torres Navarrete, publicity head of the National Lottery, and that 160-year-old institution devoted to raising funds for the Department of Public Welfare and Assistance, has published the book.

Its title is *Don Timorato Y Las Bombas*, which translates literally into Mr. Scary and the Bombs. Sixty-four pages in black, red and green and a four-page cover portray the doings and misdoings of Don Timorato during a fictitious bombing of Mexico City.

When he does the wrong thing, it appears in red. In green, he is always correct. Sitting under an open window during an air raid is pictured in red. But when Don Timorato correctly lies on a mattress under a heavy table, with radio, first aid kit, food and water close at hand, the scene is pictured in green.

Much humor and wit appear in the book and Don Timorato has become a very popular character. Copies of the book are in great demand and go from hand to hand.

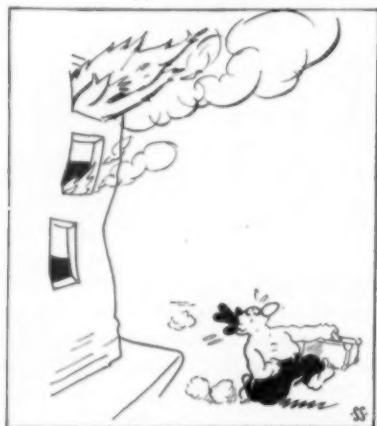
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MEDICINE

Penicillin Found to Help Relapsing Fever Cases

► PENICILLIN scored one hit and two misses in latest trials of its disease-fighting power. The hit is a lucky one for mankind, since it is against relapsing fever, a disease found in most countries and likely to become epidemic with the overcrowding and poverty that often follow war.

Hard on the heels of a report from the Mayo Clinic of penicillin's effectiveness against relapsing fever in mice comes a second report to the same effect from Harvard. This report, by Dr. Donald L. Augustine, Dr. David Weinmann



SAFETY

Mexican Don Timorato Teaches Civilian Defense

► DON TIMORATO, hero of a popular comic book, has been enlisted in the service of civilian defense and is teaching Mexicans the correct thing to do in case of bombing.

The book was written by Jorge Pinó Sandoval, Mexico's most widely read columnist, and illustrated by Antonio Arias Bernal, Mexican caricaturist whose

and Miss Joan McAllister, appears in *Science*. (Jan. 7) The Mayo Clinic experiments were reported last month by Dr. F. R. Heilman and Dr. W. E. Herrell in the clinic's own publication.

The two penicillin failures, reported

by the Harvard group, were in trypanosomiasis, one form of which is the deadly African sleeping sickness, and toxoplasmosis, a relatively new but almost always fatal disease.

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EDUCATION

Science Talent Search

About 15,000 high school boys and girls entered the third annual contest for \$11,000 in science scholarships to be awarded 40 winners.

► ABOUT fifteen thousand high school seniors competed in the Third Annual Science Talent Search conducted by Science Clubs of America for the Westinghouse Science Scholarships.

Each contestant took the Science Talent Aptitude examination, submitted scholastic records and personal recommendations. Each contestant also submitted an essay of about 1,000 words entitled "My Scientific Project."

The fortunate forty boys and girls named as finalists are being invited to Washington for a five-day all-expenses-paid Science Talent Institute to be held March 3 to 7. During this time \$11,000 in Westinghouse Science Scholarships will be awarded. Honorable mentions will also be awarded by the judges.

The annual Science Talent Search is conducted by Science Service as a Science Clubs of America activity and is open to all seniors in public, private and parochial secondary schools. The current year's contest closed on Dec. 27.

The winners and honorable mentions of the Third Annual Science Talent Search will join with a growing group of boys and girls so honored in the two previous searches. The finalists and honorable mentions in the First and Second Annual Science Talent Searches are already receiving training in col-

leges, universities and technical schools or in the armed services.

The board of judges of the Science Talent Search is composed of Dr. Harlow Shapley, director of the Harvard Observatory; Dr. Stuart Henderson Britt, now in the U. S. Navy but formerly director of the Office of Psychological Personnel of the National Research Council and consultant to the War Manpower Commission; and Dr. Harold A. Edgerton, director of Occupational Opportunities Service, the Ohio State University. The science aptitude examination was prepared by Drs. Britt and Edgerton.

The forty chosen to be invited to Washington for the March 3 to 7 Science Talent Institute include a number of girls determined by the percentage of girls who completed entries in the competition. Thus girls make their own chances in the Science Talent Search.

In March, two contestants, one boy and one girl, will be chosen to receive Westinghouse Grand Science Scholarships of \$2,400 each (\$600 per year for four years.) Eight finalists will receive Westinghouse Science Scholarships of \$400 each (\$100 per year for four years) and \$3,000 additional in scholarships will be awarded at the discretion of the judges.

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ASTRONOMY

Planet Origin Theory

► DISCOVERY of other planetary systems than ours in the universe has given support to the idea that planets are created when a pulsating Cepheid star encounters another star at a moderate distance.

Dr. H. K. Sen, of Allahabad Univer-

sity in India, in a letter to the American Physical Society's *Physical Review* (Dec. 1 and 15, 1943), points out that this theory of planet formation advanced by another Indian scientist, Dr. A. C. Banerji, in 1942 is made more probable by the recent discovery by American as-

tronomers of two planetary objects outside our solar system, but each relatively close to us.

Under the older Jeans-Jeffreys tidal theory of the origin of planetary systems, there would be at most two planetary systems in our Milky Way galaxy created during the existence of the universe, Dr. Sen figures, whereas the Banerji theory allows many more, as seems probable because of the new discoveries.

The presence of planetary systems in binary stars, as discovered first by Dr. K. Aa. Strand in the 61 Cygni system, is very plausible in view of Dr. Sen's Cepheid theory of the origin of binary stars, he believes. In this case a Cepheid star, that periodically swells up and shrinks, breaks up into two stars because of the increase or angular velocity due to radiation of energy. The filament connecting the two stars affords a chance for planets to be formed by condensation.

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PSYCHOLOGY

Noises Give Vividness To Talking Books

► NOISES of a country fair, songs of birds and ak-ak of guns give vividness to talking books—long-playing phonograph records—for blind youngsters. Unable to enjoy visual illustrations which catch the attention of children able to see, books for the blind are illustrated in sound.

A sound-picture book which tells about life on a farm and country life in general is dramatized by recording the sounds of farm animals, farm machinery and a country fair. Here the sound forms an essential part of the book.

Books about animals lend themselves especially well to sound illustrations. The story of a small boy's visit to the zoo includes in the background the trumpeting of the elephant while he is shown around the elephant's house.

A frontispiece of characteristic sounds is also used. Each chapter of a book about the circus, for instance, may be introduced by the hammering of workmen, cries of barkers, or cheers of the crowd. The text is then presented as straight reading.

During the last few years a considerable number of educational talking books have been recorded under the auspices of the American Foundation for the Blind to demonstrate different ways in which sound effects could be used.

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METEOROLOGY

Good Moisture Conditions Promise Good Wheat Crop

➤ BREAD for our own needs next year, with some to spare for hungry peoples yet to be liberated from the oppression of invaders, is promised by good soil moisture in most of the areas where winter wheat is a major crop, the U. S. Weather Bureau's regular weekly survey of crop-weather conditions indicates.

Recent generous rains in the South and Southeast have improved prospects considerably. The great wheatfields of Texas, Oklahoma and Kansas are in especially encouraging shape, with good snow cover in the latter state. The reports from Nebraska and Iowa were not so optimistic; more moisture was needed there. There are also some dry spots in Ohio valley wheatfields, but for the most part conditions there are normal.

Improved moisture conditions have been helping prospects for fresh vegetables from the South, and in the West persistent green on winter pasture has helped greatly in saving feed.

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SOCIOLOGY

Statistics Show Increase In Juvenile Delinquency

➤ JUVENILE delinquency increased 16% between 1940 and 1942, the Office of War Information states in a report of information from the U. S. Children's Bureau, the Federal Bureau of Investigation and a score of other agencies, both public and private.

Newcomers to the ranks of juvenile delinquency since the war are the commando gangs and the teen-age pick-up girls. Numerically, these 14-and 15-year-old amateur prostitutes are more important, it appears from the figures showing a 38% increase in juvenile delinquency among girls, compared to an 11.3% increase for boys.

Figures do not tell the whole story and may give an erroneous picture in some cases, the OWI report points out. Juvenile delinquents are children caught violating the law and brought into the juvenile court. In some localities, however, children who are caught breaking the law may be dealt with by police or social agencies, without being brought to juvenile court. This lowers the delinquency figures for that community. In other communities, the figures may be equally misleading on the other side. In a New

England town, for example, the delinquency rolls were increased by a 12-year-old boy brought to the court because he tried to wriggle a penny out of a slot machine.

The picture is not all dark, however.

"Many of the authorities who furnish authentic data about the rise of juvenile delinquency in certain areas," OWI reports, "likewise furnish equally reliable data to indicate that the great majority of American children are measuring up well to the demands of the war emergency."

Crowded homes and schools, absence of parents, lack of religious or recreational facilities, the spell of the uniform and the lure of the pay check are among the causes given by various authorities for the war rise in juvenile delinquency.

Remedies tried vary from curfew laws to dry night clubs for teen-agers. Careful study of the problem locally, followed promptly by action to remedy the causes found in a community, seems to offer most promise of effective control of the situation.

Science News Letter, January 15, 1944

WILDLIFE

War-time Rations For Pheasant Chicks Mapped

➤PHEASANT CHICKS adapt themselves to war-time diets in which the customary dried milk products, meat scraps and fish meals are replaced by less expensive and more plentiful soybean oil, dried whey and dried brewers' yeast to a far greater extent than generally anticipated, W. J. Stadelman, R. R. Murphy, E. W. Callenbach and R. V. Boucher of Pennsylvania State College report. (*Journal of Wildlife Management*, January)

In an experiment carried out by the Pennsylvania State College scientists, eight groups of 125 ring-necked pheasant chicks were reared to six weeks of age with eight varieties of these substitute product rations. All the rations tested were found highly satisfactory.

A factor of considerable importance in diet choice, the scientists point out, is the resulting quantity and quality of feather development and maintenance. The birds in all eight groups were sufficiently feathered for release at the end of the six-week period.

Selection of any of the rations in this report should be based primarily on availability and relative cost of the ingredients specified, the scientists recommend.

Science News Letter, January 15, 1944

IN SCIENCE

AGRICULTURE

Crop Insect Pests May Be Combated by Heat Method

➤ TO ASSIST harried South American farmers who are losing as much as 50% of their corn crop because of insects, but are unable to obtain fumigants to combat them, a new method of attacking by heat is under investigation by the Institute of Inter-American Affairs at Iowa State College.

Now being developed by Paul Douglas, associate engineer of the food supply division of the Institute, the solution to this South American farm problem calls for the construction of a brick storage building, 14 feet high and six feet wide, in which can be stored 160 bushels of shelled corn, the harvest from about ten acres.

Through the center of this building, a wood furnace and flue are built to furnish the temperature of 120 degrees Fahrenheit which is needed to kill the pests.

Detailed plans for the structure, method of operation, handling of the corn at harvest, preliminary drying for storage and determination of moisture content are expected by Mr. Douglas to be available for the South American farmers upon completion of the present research project.

Science News Letter, January 15, 1944

ORDNANCE

Cooling Method for Machine Guns Uses Compressed Air

➤ A METHOD of cooling machine guns by means of compressed air instead of the more familiar water or atmospheric air is the subject of patent No. 2,337,840, issued to Hubert Scott-Paine and R. W. Jaggard of Hythe, England.

Escape of air from the flask, in which it is provided at a pressure of 300 pounds per square inch or over, is controlled by a valve, which in turn is thermostatically governed by the degree of the gun's heating. The weapon is said to weigh much less than a water-jacketed machine gun, and not to require the frequent change of barrels necessary in the conventional air-cooled type.

Science News Letter, January 15, 1944

NE FIELDS

CHEMISTRY

Pest-Killing Chemicals Are Now Being Catalogued

► "CHOOSE your weapons!" will have more efficient significance to fighters against insect and fungus pests, once the general catalog of all known pest-killing chemicals now being compiled has been completed and published. Prof. Donald E. H. Frear of the Pennsylvania State College, who has charge of the task, states that already about 5,000 individual compounds have been listed and their properties described, from more than 500 published sources. (*Science*, Dec. 31, 1943)

Prof. Frear is anxious to add more insecticides and fungicides to his list. He invites fellow-scientists to send in names and descriptions of any they have tried, even those that have not proven successful. It is often worth while reporting negative results, to enable other workers to avoid repeating the experiments, with loss of time and money. Sometimes, too, a later worker can find and remove the "bug" in an earlier experiment, carrying it through to success.

The catalog will be published at the earliest practicable date, Prof. Frear states, adding that every scientific worker who sends in a useful addition to pesticidal knowledge will be assured of a copy.

Science News Letter, January 15, 1944

NUTRITION

Potato No More Fattening Than Big Juicy Apple

► WHAT WITH a bumper potato crop on hand and many other foods being scarce, we are all probably eating more spuds this winter than ever before. Those who are trying to regain or retain a slim figure are probably rather worried over this prospect.

If you know your calories, you know that one medium-sized baked potato is no more and no less fattening than a big juicy apple, a large orange or a medium-sized baking powder biscuit. Each of these four foods contains about 100 calories.

Of course, not many persons eat more than one big orange or one big apple a day, whereas many eat at least two medium-sized potatoes daily. The pota-

atoes, moreover, usually get their calories, and fattening quality, stepped up by the butter or margarine or other fat served with them. These facts doubtless account for the reputation potatoes have acquired for being fattening.

On the other side of the picture, if you are really interested in keeping your weight down, consider the baking powder biscuit. With our present fat ration, you probably will not be getting these very often, but when you do have them, how often do you limit yourself to one medium-sized one per meal?

Potatoes furnish more than the calories which come from its 11 to 21% starch content. There are vitamins and minerals in potatoes, too. U. S. Department of Agriculture home economists point out that, weight for weight, potatoes have one-fourth as much anti-scurvy vitamin C as oranges or lemons. This is something to remember during the season when oranges are scarce and expensive.

Potatoes also supply some vitamin A (sweet potatoes are particularly good in this respect), and two B vitamins, thiamin and riboflavin. Finally, they are a good source of iron and phosphorus.

Science News Letter, January 15, 1944

HORTICULTURE

Expert Victory Gardeners Asked to Assist Amateurs

► DID YOUR last year's Victory Garden crop set the production pace in your area? If so, you should lend a hand in the gardening problems of your less experienced neighbors, whose crops of radishes and weeds looked a bit sickly in comparison with your flourishing homegrown supply of edibles, the U. S. Department of Agriculture urges.

In many a neighborhood last year, it is reported, seasonal gardeners raised from two to five times as much food as the man next door who tried just as hard but couldn't get results. Although many of the old-time gardeners are glad to help, they hesitate to offer advice unless asked. And the Victory Garden headquarters of the Department of Agriculture strongly recommends that local Victory Garden committees everywhere assist in the asking.

The burden on transportation and food production last year was substantially eased by the output of 20 million Victory Gardens. Cooperation this year to boost the output would go a long way in lessening the pinch of the current manpower shortage on the home front.

Science News Letter, January 15, 1944

ZOOLOGY

Rat Damage Last Year Estimated at \$200,000,000

► RATS are saboteurs of the most destructive sort, it appears from figures compiled by U. S. Fish and Wildlife Service biologists. The damage they caused last year is estimated at more than \$200,000,000—easily enough to pay for two new battleships of the Iowa class, or three aircraft carriers like the Essex.

Rat damage went up during 1943 not so much because there were more rats as because the cost of commodities in general had increased. Higher cost of living means higher cost of keeping rats on the premises.

Men experienced in rat control estimate the over-all rat population of American farms at around 60,000,000. The farm is the rat's great stronghold today; there he can find plenty of hideouts and plenty of food he can steal. Cities harbor fewer of the impudent vermin nowadays; improved rat-proof construction, better clean-up of garbage and the vanishing of the city horse are cited as factors in the rats' back-to-the-farm movement.

In addition to their role of thieves, rats are incendiaries. They steal matches, gnaw wire insulation, cause leakage of chemicals. Worse still, these vermin harbor smaller vermin (fleas) which in turn are carriers of two much-feared diseases: the American form of typhus fever, and bubonic plague.

Science News Letter, January 15, 1944

CHEMISTRY

Iron Salts Satisfactory For Leather Tanning

► IRON SALTS may be used in leather tanning while the scarcity of the standard chromium solutions continues, but the resulting leather will probably show less resistance to aging.

This conclusion has been reached in the National Bureau of Standards where Dr. Joseph A. Kanagy and Ruth A. Kronstadt have been studying the possible replacement of chromium salts with those of iron in tanning goat and calf skins. The work is continuing.

Ferric sulfate may be used satisfactorily, they find, if organic acids are added to the tanning solutions to stabilize them. Lactic, citric, gluconic and hydroxyacetic acids were found suitable. Considerably more iron than chrome is required to tan a piece of leather, the amount being about double.

Science News Letter, January 15, 1944

MECHANICS

Bringer of Light

Sweden's Gustaf Dalén invented the sun-valve beacon, which guides ships and planes, and incidentally devised safe method of bottling acetylene gas.

By ERIK WÄSTBERG

► EVERY ship captain feeling his way through perilous channels, every air pilot who flies commercial lanes by night, every welder wielding his blazing torch on Liberty ship or warplane owes a debt of gratitude for his safety to Gustaf Dalén, a man of whom he doubtless never heard.

Dalén was a Swedish peasant whose passion for things mechanical led him through all obstacles into the immortal company of Nobel Prize winners. He was one of the world's great inventors, and all of his major inventions were designed to save lives.

When Thomas Edison first heard of Dalén's most ingenious device, the sun-valve—which, without cogs, wheels, electricity or clockwork, automatically lights beacons when darkness falls and puts them out at sunrise—he said, "It won't work." The German Patent Office snorted that his device was "impossible."

But it does work. Dalén's automatic beacons dot the coasts and harbors of the world—the U. S. Lighthouse Service alone uses 5,000 of them. Thousands more are used on airways and airfields. As part of his work on beacons, Dalén invented the safe method of bottling the highly explosive acetylene gas, essential not only for beacons but for welding.

His Eyes Destroyed

By a bitter twist of fate, the man whose lights fringe the Seven Seas never got to see them. Just when world recognition and wealth began to reach him, an explosion during one of his experiments destroyed his eyes. He walked in darkness for the last 25 years of his life, but dauntlessly pressed forward with his research and inventions.

Gustaf Dalén was born November 30, 1869, on a tiny farm in southern Sweden—one of several children in a peasant family. Their life was rigorous, and the children had tasks for every waking hour. As a boy, Dalén detested farm chores, and his first invention was a threshing machine to shorten the hated job of shelling the winter's supply of

dried beans. The threshing machine was powered by an old spinning wheel, and the crowning touch was that Gustaf persuaded his little brother it was fun to pump the treadles.

All his life, Gustaf Dalén hated to get up in the morning; to the end of his days he averaged nine hours' sleep a night. His second boyish invention was a fantastic sleep-prolonger. He got hold of an old wall clock and rigged it to rotate a spool at a set time. The spool rubbed against a match and ignited it. An elaborate arrangement of cords and levers swung the match over the wick of an oil lamp and lighted it. A coffee pot hung over the lamp flame. In 15 minutes the clock started a hammer beating against an iron plate. Thus Gustaf was awakened in a lighted room, with hot coffee ready.

While still in his 'teens, Gustaf de-

signed a milk tester. It worked so well that he took his model to Stockholm to show it to De Laval, the famous inventor of the cream separator. "What an extraordinary coincidence!" exclaimed De Laval and showed the lad blueprints of a device on which he had already applied for patent. It was an almost identical tester. Young Dalén promptly asked for a job in De Laval's laboratory. "Not yet," the older man replied. "Get sound theoretical training first."

Young Gustaf's excitement over the master's approbation was overcast by a serious problem. His older brothers had already gone out into the world. They counted on him to maintain the farm which had been the family property for hundreds of years. But more than anything in the world, Gustaf Dalén wanted to use his talent for invention. He was a gentle, conscientious person; how could he leave his family? Reluctantly, he made his decision. He returned home. Later he wrote one brother: "Ninetenths of my thoughts are occupied with mechanics. How will it all turn out?"

Gustaf fell in love with a pretty, 15-



FRIENDLY AID—The help of the natives of the South and Southwest Pacific islands has been of tremendous assistance to the U. S. armed forces in those areas. This official U. S. Army Signal Corps photograph shows an Army Medical Corps officer treating a New Guinea baby for ringworm.

year-old girl from a nearby village and talked to her of marriage. She told him she would not be a farmer's wife. Her attitude reinforced Dalén's strong desire for an engineering career, and he resolved to leave the farm.

It was not until he was 23, however, that he was able to break away. In 1892, he left before the crops were harvested, to enter the Technical Institute in Göteborg and hurled himself happily into the wonderful world of mechanics. He theorized, he experimented, he reveled in his work. He was too busy to eat and sleep, too happy to care that he had almost nothing to live on. After graduating with honors, he went on to advanced studies in Zurich, Switzerland.

Finally, after five arduous years, Gustaf knew he was ready for that job in the De Laval works. Finally he was able to marry the girl who had waited so devotedly for him. They moved into a tiny Stockholm flat, which promptly became more laboratory than home, because Dalén spent every free moment on his experiments. "Ideas, ideas!" a colleague of his remarked. "Dalén had 20 ideas a second! Many were hopeless, but the good ones showed real genius."

The young man also became an agent for an acetylene company, the beginning of a business connection which later developed into the now world-famous AGA (Aktiebolaget Gas Accumulator) company.

For years, Sweden had spent far more money than it could well afford on the men and equipment needed to maintain the great number of lighthouses its rugged coast and archipelagoes required. Every lighthouse had to have a keeper, living quarters for him and his family, a boat quay where supplies could be landed, and there even had to be special school facilities for lighthouse keepers' children. The government was eager to lighten this burden, and by the late '90s had developed a beacon that required attention only once in ten days.

Kept Working

Dalén thought that was not good enough, and kept working on the problem. One May day in 1905, he was ready to test a new device he had invented. He drew the curtains in his flat and attached the mysterious gadget to the gas pipe. Dalén struck a match, held it to the outlet. Tensely he watched. Soon, with a slight pop came the first, brilliant flash of light. It died, was followed by another flash, then another, and another. He had invented the automatic flasher,

a rather simple affair of levers and magnets. The first model was so well-designed that no changes except insignificant modifications have ever been made.

Now Sweden could have its automatic beacon. The device would look after itself, could be set for the different flashes and signals desired, and would reduce gas consumption by 90%. Since the acetylene gas containers would last ten times as long as before, one boat could look after numerous lights, recharging them once in several months. Beacons could be placed in dangerous locations that could be reached only at rare intervals.

What does an inventor say when he sees his theories triumphant, and when he knows his work will help his nation, and the world, and save countless lives? Dalén turned to his young wife, who was looking on admiringly, and said, "You know, dear, we shall certainly make money out of this."

Beacon Successful

They did. The Dalén beacon was immediately successful. But its inventor was not satisfied. The beacon still wasted gas, because it blinked both night and day. After only one month of concentration, Dalén found the answer—the sun valve, that device which neither Edison nor the German Patent Office believed possible. Dalén merely followed the law of nature which people follow when they wear white in the summer. On the principle that a white or highly-polished surface reflects heat while a black, unpolished surface absorbs heat, he devised a valve comprising three brightly polished metal rods and a fourth black rod. When the sun rises and its rays hit the valve, the black rod absorbs more heat than do the white rods. The resultant uneven expansion actuates a lever which closes the hole through which the gas flows to the light. Thus the valve extinguishes the beacon when full daylight comes. With darkness, the metal rods shrink to the same length, opening the gas jet again.

The beacon had reached full efficiency. Beacons to run a year without attention were fully practical. But Dalén and his assistants were not finished. They now turned their attention to the acetylene gas. Engineers had developed methods of accumulating and storing the gas under pressure in steel cylinders. But acetylene—92.3 parts carbon and 7.7 parts hydrogen—is highly explosive, and it had caused frequent horrible accidents. Using a liquid solvent or packing the cylinder with such materials as charcoal and asbestos had not proved satisfactory. Dalén

and his men began experimenting with new ideas.

It was dangerous work.

"I remember," reminisced Gustav V. Karlson, now in the American AGA plant, "one day in Sweden when Dalén and I were working with the gas. One small cylinder exploded and when I crawled out from under the table I saw it had blown Dr. Dalén clear across the room."

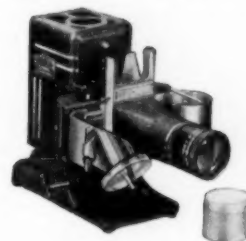
Hit Upon Something

Finally the indefatigable researchers hit upon something—a porous mass somewhat like cement (asbestos and diatomaceous earth among its ingredients)—which acts as a sponge. Gas saturates this sponge and the gas is therefore distributed through the cylinder so evenly and in such small particles that it cannot explode. This new porous mass had amazing effects on an industry quite unrelated to beacons.

For the first time, the use of acetylene gas for welding became safe. Many other factors, of course, have contributed to the tremendous growth of welding, but Dalén's contribution of safety was the foundation.

Dalén's company, AGA, sprang into

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world prominence, and expanded from a group of 15 men to hundreds of employees, and branch offices in many countries. Dalén further perfected his beacon system by inventing an automatic changer for the incandescent mantles used in large lighthouses, and by experimenting until he developed a mixer of gas and oxygen which yielded the utmost efficiency in lighting.

By 1912 Dalén had achieved world recognition. His inventions were accepted everywhere. He had won the contract for lighting the Panama Canal, of which he was very proud. He and his wife and children were for the first time able to enjoy the better comforts of living—fine food, the theater, social life with their friends. They moved into a new village outside Stockholm, and were just settled when two American engineers came to see the master Swedish inventor.

Problems of Safety

While discussing problems of safety, the three engineers decided to find out how the acetylene accumulators would behave in case of fire. "It's not at all dangerous," Dalén assured them. "The safety devices are perfect." So the men lit a huge fire in a cleft of rocks and hung the gas-filled cylinders over the fire. Back in the laboratory's observation room assistants checked the valves and pressures.

At first the safety devices functioned to perfection. On the fifth repetition of the experiment observers noticed that the gas pressure was falling. (Later they found a defective valve.) Dalén and two of his assistants waited half an hour, then approached the fading fire. Suddenly, as they neared it, a steel cylinder exploded with a report which was heard for miles.

Jagged pieces of steel whizzed through the air. By a miracle the two chemists escaped with only minor injuries, but Dalén's body was covered with the

scalding mass that spurted from the shattered cylinder, his face was black and bleeding, one eye was almost torn from its socket, his clothes were flaming. Rescuers beat out the fire with their bare hands. As Dalén lay by the roadside waiting for the ambulance, he asked if anyone else were hurt. Not seriously, he was told. "I am glad," he said. "It is only right that I, who am responsible for all this, should suffer most." Hospital physicians and Dalén himself thought he would die. To his wife he gasped, "Our happy story is at an end. I would have liked to see our children grow up."

But Dalén did not die. His strong peasant body and his magnificent will combined to win in his fight to live. His sight, however, was gone forever. His brother, Albin, who had become Sweden's outstanding eye specialist, tried his best to save the one eye whose optic nerve was still intact. He made a trip to the United States, and for months he and Dr. Alexis Carrel experimented with transplanting corneas. All over the world people heard of their labors, and Gustaf Dalén was much moved to learn that many people had offered one of their corneas that the great inventor might go on with his work. The two doctors finally decided that it couldn't be done. Gustaf Dalén would never see again.

Received Nobel Prize

While the inventor lay helpless and in pain, he learned that the Swedish Royal Academy of Science had bestowed upon him the 1912 Nobel Prize in physics. Dalén was grateful, but he was also saddened by this honor. "What do they expect of me who can no longer do anything," he asked, and lay with tears streaming from his sightless eyes while admiring students serenaded under his window.

Soon, however, Dalén determined that he would learn to do things, and to enjoy life again. When his strength re-

turned he went back to his job as president of AGA. He returned to his first love, designs, and assistants working with him found that, so amazing was Dalén's memory, they could describe drawings to him and he would immediately hit upon any detail that needed correction. Much of his business he conducted from his desk, talking over a battery of telephones, keeping innumerable details in his memory.

He also returned to social life—the theater, parties, ice skating. Always dapper and well-groomed, Dalén would turn up, walking alone, a fresh boutonniere in his coat lapel, the gayest member of the party.

Became Statesman

The inventor's blindness, of course, forced him to give up many phases of engineering. This gave him time to turn to other fields. He made long trips abroad. He became one of Sweden's elder statesmen, consulted by the government on many problems, particularly on monetary affairs. Soon he was a familiar sight at all state functions, a beaming, lively companion whose dark glasses were the only indication that this was a man who could not see.

He encouraged his company to branch out into new production. The tremendous growth of automobile traffic after the first world war made AGA blinkers of tremendous value on the highway. Railroad engineers had already found them invaluable. Then came aviation. When transcontinental mail, complete with night flying, was first established, AGA beacons and landing field markers did much to make it practicable.

Dalén himself devised the AGA stove—a masterpiece of efficiency and economy which maintains cooking heat 24 hours a day with a consumption of only 8 pounds of coal. In the United States the AGA stove is of particular value in places where electricity or gas is unavailable or to which it is difficult to transport coal. At present our Coast Guard buys the entire output of these stoves for their remote stations.

In 1936 the 67-year-old president of AGA called a meeting of his board of directors. "I must tell you," he began quietly, "that my doctor tells me I have a cancer which cannot be cured. I shall go on as long as I can." He calmly consulted the notes in his hand, went on with the next item of business.

He steadily grew worse. One of his experiments had cost him his eyes. Now in a kind of poetic compensation, one of his inventions eased his otherwise in-

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tolerable pain. The flasher cut-off valve he had contrived for lighthouses had been adapted for the administration of partial anesthesia, and it was used to keep him in a kind of twilight sleep.

On December 9, 1937, Gustaf Dalén died in his lovely villa overlooking Stockholm harbor. As Swedish and foreign ships made their way through the icy harbor, that dark December day, each ship reduced speed, each flag was lowered, in mourning for the man who had lighted their way home.

Science News Letter, January 15, 1944

RADIO

Color Television Produced By Subtractive Method

► AS EXPERTS debate whether post-war television must be restricted to black-and-white reproduction or whether color pictures can be brought to American homes at once, color reception has been advanced still another step.

Adapting the "subtractive method" of ordinary color photography to television, instead of using the "additive method" often proposed, Adolph H. Rosenthal of New York has produced pictures of equal brilliance with only a fraction of the illuminating light necessary in the latter method.

White light is passed through successive transparent image screens which "subtract" the unwanted color wavelengths of the light. A patent is pending on the ionic crystal type of screens used.

Science News Letter, January 15, 1944

ORDNANCE

Time Fuse Uses Gas Instead of Powder Train

► A NOVEL type of time fuse for artillery shell is the subject of patent No. 2,334,182, obtained by Stanley Farrow of Denville, N. J. For the customary powder train, whose slow burning determines the moment of explosion, a container of gas under pressure is substituted. This is punctured when the gun is fired, and its rate of escape is regulated by a pre-set mechanism. When enough of the gas has passed through a pellet of a chemical catalyst to heat it to ignition temperature, it sets off a booster charge of powder, which in turn explodes the main charge.

Mr. Farrow has assigned to the U. S. Government the right to manufacture and use his fuse without payment of royalties.

Science News Letter, January 15, 1944

METEOROLOGY

Your Coal Bin Should Now Be More Than Half Full

► DOES the top of your coal pile, or the gauge on your oil tank, still stand a bit above the half-way-down mark?

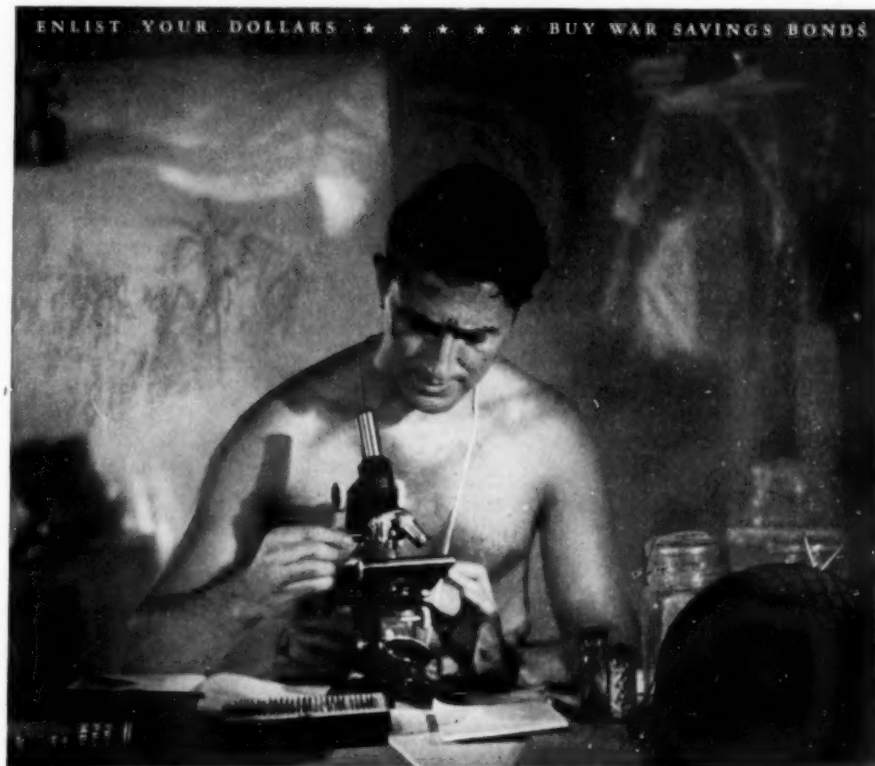
If so, OK. If not, get set for chills, warns the U. S. Weather Bureau.

The middle of winter, measured in practical terms of days of really cold weather, normally comes about Jan. 15 in the South, Jan. 17 or 18 in the central

and northern Plains, and Jan. 22 to 24 in the Great Lakes region and the Northwest. So the farther north-northwest you are, the higher that coal-pile top or oil gauge should be.

There's a joker in this, though—as there always is in the weather deck. The Bureau hedges: "As these dates are normals, or long-time averages, the mid-season for individual years frequently differs considerably from them, depending on whether the first half or last half of the winter is the colder."

Science News Letter, January 15, 1944



How Americans Are Kept in Fighting Trim



On some South Pacific island, in Africa, or on our northern battle fronts . . . wherever there is a force of American soldiers . . . you will find a medical officer equipped with a microscope.

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Microscopes are typical of the many Bausch & Lomb optical instruments that are performing vital war duty on the home front . . . in the industrial research and control that speed the production of the tools of Victory . . . and in the medical and scientific research that will make it a better world to which these boys will return. Here again, optical science is seeing it through.

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Do You Know?

Crops have been *irrigated* in the northern section of the Po valley in Italy since the 13th century.

Twelve miles from the earth the *temperature* is lower over the equator than it is over the North and South poles.

The only known place in the United States where *crude oil* production can be substantially increased is in West Texas.

Workers wear *gloves* when packing metal war instruments because sweaty bare fingers leave moisture that may cause rust.

The *air route* from San Francisco to Japan via the Aleutian Islands is over 1,700 miles shorter than the route via the Hawaiian Islands.

Perennial *range plants* thrive and spread only as they are able to store up food in stem bases and roots, with which to start new growth the following year.

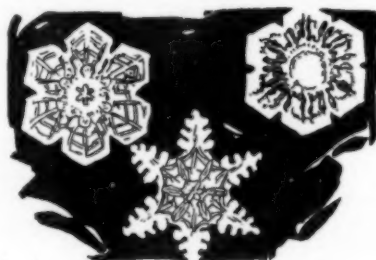
The Alaska male willow *ptarmigan* is white in winter and brown in summer, excellently camouflaged for winter snow and summer tundra; in the spring the bird has a bright scarlet comb.

Sweet *lupines*, a striking recent achievement in plant breeding in Germany and Russia, produce seed rich in digestible protein which is of a high biological value, said to rank next to soybeans.

New high-tension electrical ignition *cable* is made of monel metal wires twisted together and covered with a synthetic rubber compound which is reinforced by a braid of glass fiber to add tensile strength.

Transparent *fused quartz* articles for chemical, medical and industrial apparatus are shaped by quartz blowers from pure crystals obtained mostly from Brazil; skilled human blowers produce better products than machine blowers.

Pigeons were used as messengers by King Solomon and the ancient Persians, it is claimed; in 560 B.C. they spread news from the Olympic games and in 43 B.C. they were used by Brutus, besieged at Mutinia, to summon aid.



No Two Alike

See Front Cover

➤ SNOW CRYSTALS are always hexagons, but there their resemblance ceases. Within that simple basic geometric pattern there are literally infinite variations of outline and pattern and despite the many thousands that have been minutely examined and photographed by scientists and amateurs, no duplicates have ever been observed. It is quite within the realm of possibility that every snow crystal that has ever fallen, since the time millions of years ago when the earth's atmosphere became cool enough to permit snowflakes to float through it at all, has been unique and distinct from all others.

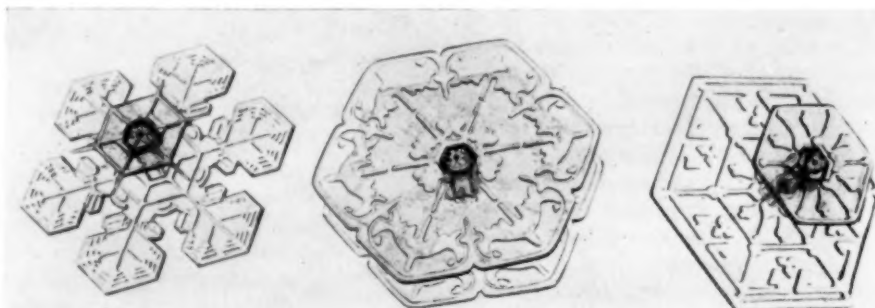
Formation of snow crystals begins in the same manner as the formation of raindrops, with the attraction of water-vapor molecules to an electrically charged solid particle of some kind—a microscopic dust grain, perhaps, or an invisibly tiny fragment of salt. If the temperature is low enough for ice for-

mation without an intervening liquid-water phase, the eventual result is a snow crystal. Since millions upon millions of water molecules assemble themselves into the growing pattern, it would be astonishing indeed if we were to find any exact repetitions.

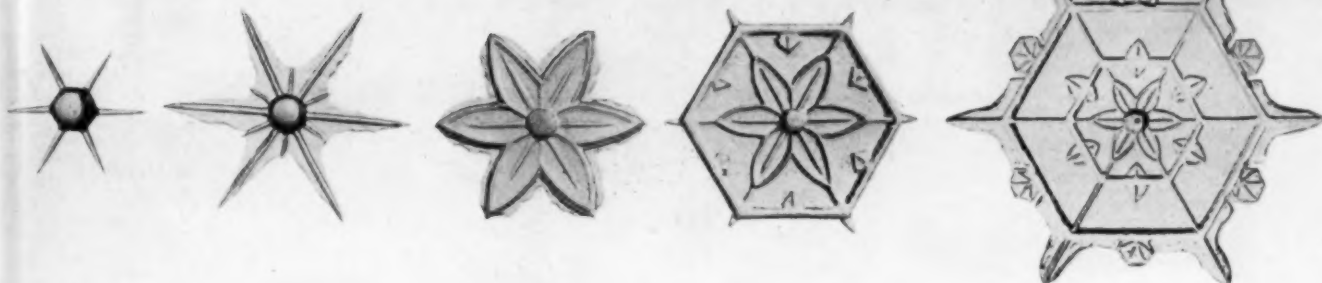
One general observation has been made by meteorologists on the outlines and degree of sculpturing or "ornamentation" in snow crystals. Those formed at low altitudes, where air humidity and temperature are both relatively high, have finely divided, feathery patterns, while those that form in very cold, relatively dry air at great heights have simpler, straighter outlines and less surface sculpturing.

Sometimes twinned crystals are observed, one tiny hexagonal plate at either end of a short connecting rodlet of ice—the so-called dumbbell or stud pattern. It is noteworthy that even here, though the crystals are Siamese twins, they are still not identical twins. Once in a while you may think you have found a triangular crystal instead of the usual hexagonal type. A closer look, however, will always show that the corners of the triangle have been clipped off, so that the pattern after all is a hexagon—a regular, but unequal-sided hexagon.

Photographing snow crystals used to be a difficult job, requiring great skill and devotion, as well as willingness to work for long periods in the outdoor cold. Recently, however, a researcher in the laboratories of the General Electric Company, Vincent J. Schaefer, showed how to make perfect molds of their patterns by carefully placing selected crystals on a thin plastic solution known by the trade name of Formvar 15-95. After the crystal melts and the water disap-



NATURE'S COLLAR-BUTTON—These rare, stud snow crystals with a hexagonal plate on each end of a hexagonal column were photographed from models by Edwin H. Reiber. These are travelers from a great height and frigid temperature.



appears, a perfect and permanent record of its shape remains in the hardened plastic, which may be studied and photographed at leisure and in indoor comfort.

The illustration on the front cover of

this SCIENCE NEWS LETTER is from a photograph of a glacial model of a snow crystal, made by Edwin H. Reiber of Webster, N. Y., for the Buffalo Museum of Science.

Science News Letter, January 15, 1944

METEOROLOGY

Long-Range Forecasting

Timing the establishment of a new European front will be greatly aided by weather predictions for a month ahead, General Arnold's report discloses.

► LONG-RANGE weather forecasts, a peacetime dream that seemed unrealizable, have become a working actuality because fighting men, especially winged fighting men, simply had to have them. Pictures of what the weather will be like at the end of two days, 10 days, 30 days are now possible, "with sufficient accuracy to permit of making preparatory plans for future operations," Gen. H. H. Arnold, in command of the Army Air Forces, states in his report to Secretary of War Stimson.

At the beginning of the war, 48-hour forecasts were common enough. But that little time is insufficient margin when plans for a continental-scale invasion of hostile shores are being made. Insistence on working long-range forecasts "at first met considerable opposition both inside and outside the Army Air Forces," General Arnold comments. By pooling all information in United Nations meteorological brains, together with some further knowledge captured from German sources, the job was done, and put on a world-wide scale, at that.

Forecasting weather for the Army Air Forces is often as perilous a job as flying through that weather at its worst, the report indicates. The story is told of one group of meteorologists who undertook to

set up an observing station on a narrow ledge in an ice-jammed fjord at Prince Christian Sound on the desolate, uninhabited southern coast of Greenland. The buildings have to be tied down to the rocks with cables, to keep from being blown off by the 90- to 175-mile-an-hour winds that prevail there.

There has been a tremendous increase in Air Weather Service, as in all other branches of the fighting forces, General Arnold points out. For this particular work, the personnel has been multiplied ninety-fold.

Science News Letter, January 15, 1944

Just Off Press

AMERICAN GEOPHYSICAL UNION TRANSACTIONS OF 1943: Part I. Reports and Papers, General Assemblies and Sections of Geodesy, Seismology, Meteorology, Terrestrial Magnetism and Electricity, Oceanography, Volcanology, and Tectonophysics—*National Research Council*, 330 p., illus., \$3.50, paper.

AMERICAN GEOPHYSICAL UNION TRANSACTIONS OF 1943: Part III. Reports and Papers, Joint Regional Meeting, Section of Hydrology, Western Snow-Conference, Corvallis, Oregon—*National Research Council*, 99 p., illus., \$1, paper.

THE EMBRYOLOGY OF LARIX—James Morton Schopf—*Univ. of Ill. Press.*, 97 p., illus., \$1.50, paper.

FOOD AS AN IMPLEMENT OF WAR: The Re-

EVOLUTION—A snow crystal, born in the cold regions of the upper air, begins with the nucleus of frozen water molecules, the first six radiating arms shown at the far left prophesying the final hexagonal form shown in the cover picture. This series of pictures of models, made by Edward H. Reiber for the Buffalo Museum of Science, shows the various stages of development through which this snow crystal passed.

sponsibilities of Farmers—Joseph S. Davis—*Stanford Univ.*, 20 p., 10c, paper.

HANDBOOK OF HEALTH FOR OVERSEAS SERVICE—George C. Shattuck and William J. Mixer—*Harvard Univ.*, 228 p., illus., \$1.25, 2nd ed. rev.

INSECTICIDES AND EQUIPMENT FOR CONTROLLING INSECTS ON FRUITS AND VEGETABLES—N. F. Howard & C. A. Weigel—*Dept. of Agr.*, 52 p., illus., 10c, Misc. pub. No. 526, paper.

LABORATORY MANUAL OF SPOT TESTS—Fritz Feigl—*Academic Press*, 276 p., illus., \$3.90.

LEND-LEASE: Weapon For Victory—Edward R. Stettinius—*Macmillan*, 358 p., illus., \$3.

MYXOPHYCEAE OF EASTERN CALIFORNIA AND WESTERN NEVADA—Francis Drouet—*Field Museum*, 30 p., 15c, Vol. 20, No. 7, Paper.

THE OUTDOORSMAN'S COOKBOOK—Arthur H. Carhart—*Macmillan*, 211 p., \$1.95.

RISE ABOVE COLOR—Philip Henry Lotz—*Assn. Press and Revell Co.*, 112 p., \$1.50. The stories of a number of noted Negro persons.

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• New Machines and Gadgets •

❁ **LUMINOUS** adhesive sheet or tape material which will glow in the dark because of a phosphorescent or fluorescent surface has recently been patented. It is claimed suitable for applications to objects for identification at night, such as keyholes.

Science News Letter, January 15, 1944

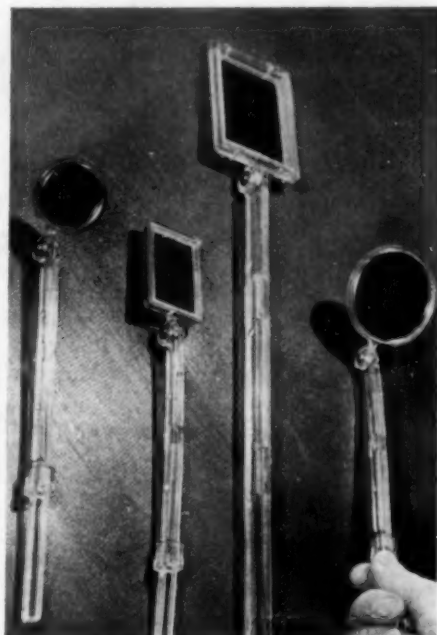
❁ **LADIES'** handbags with bottoms of light-transmitting material permit the entire contents to be examined when the tops are opened. A transparent or translucent plastic is used in this patented device. The shape and general appearance of the bags are unaltered.

Science News Letter, January 15, 1944

❁ **COMBINATION** sun visor and radio aerial for an automobile looks like the ordinary double visor, but its body is made of metal suitable for an aerial, electrically insulated from the vehicle. The device was recently patented.

Science News Letter, January 15, 1944

❁ **HINGED** mirrors on long handles are used to inspect out-of-the-way places inside machinery and other equipment.



The thumb of the inspector pressed against a knob on a small rod attached to the light plastic handle quickly turns the mirror at varying angles to its handle.

The picture shows several types of mirrors and handles.

Science News Letter, January 15, 1944

❁ **ELECTRONIC** de-icer controls on airplanes have push-button devices similar to those on the familiar night-club jukebox. A pilot notes where ice is forming on a wing, pushes the correct button, and a rubber de-icer boot cracks the ice.

Science News Letter, January 15, 1944

❁ **STREETS** may be cleaned of leaves by an enlarged vacuum cleaner equipped with a three-horsepower motor. In use in a southern city, the machine sucks up the leaves and crushes them into small bits suitable for fertilizer.

Science News Letter, January 15, 1944

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 190.

Question Box

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How are rocket planes like the kick of a gun? p. 34.

HORTICULTURE

How many Victory Gardens were there last year? p. 41.

EDUCATION

How many high school boys and girls are entered in the Third Annual Science Talent Search? p. 39.

GENERAL SCIENCE

What does the future probably hold for science? p. 35.

Who is the new president of the A.A.A.S.? p. 35.

MECHANICS

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MEDICINE

Of what value was penicillin in treating war wounds in North Africa and Sicily? p. 37.

METEOROLOGY

How can meteorologists help in timing a new European front? p. 47.

How full should your coal bin be at this time of year? p. 45.

NUTRITION

How fattening are potatoes in comparison with apples? p. 41.

ORDNANCE

What is used instead of a powder train in a newly invented time fuse? p. 45.

What new method has been devised for cooling machine guns? p. 40.

PALEOBOTANY

What has enabled scientists to know that the climate in Texas was once like that of the Great Lakes region? p. 36.

PSYCHIATRY

What means of controlling alcoholism is being initiated at Yale? p. 35.

PSYCHOLOGY

How are books for blind children "illustrated"? p. 39.

PUBLIC HEALTH

Why is it unlikely that we shall have an influenza pandemic? p. 38.

RADIO

How may color television be produced? p. 45.

SAFETY

What is one method whereby the Mexicans are taught civilian defense? p. 38.

SOCIOLOGY

What was the percentage of increase in juvenile delinquency between 1940 and 1942? p. 40.

Where published sources are used they are cited.

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